This listing of claims will replace all prior versions, and listings, of claims in the application.

LISTING OF CLAIMS

1. (cancelled)

2. (currently amended) The gyroscope of claim 6 ~~1~~, further comprising:

a photodetection system that converts a received light signal from the source-detect coupler into an electrical signal, and provides the electrical signal to the detected signal input of the phase sensitive detector.

3. (currently amended) The gyroscope of claim 6 ~~1~~, further comprising at least one of:

a first waveguide coupled between the light source and the source-detect coupler;

a second waveguide coupled between the photodetector and the source-detect coupler;

a third waveguide connected to the source-detect coupler;

a fourth waveguide coupled between the source-detect coupler and the sensing coil coupler; and

a fifth waveguide coupled between the sensing coil coupler and the phase modulator.

4. (original) The gyroscope of claim 3, wherein at least one of the first through fifth waveguides comprises fiber-optic cable.

5. (currently amended) The gyroscope of claim 6 ~~1~~, wherein the saw-tooth wave has a frequency equal to a proper frequency of the gyroscope.

6. (currently amended) ~~The gyroscope of claim 1, further comprising:~~

A gyroscope, comprising:

a light source that is configured to provide electromagnetic radiation for the gyroscope;

a sensing coil that is configured to sense rotation about an axis, the sensing coil having a first end and a second end;

a source-detect coupler comprising an input that is connected to the light source, and further comprising a detected signal output;

a sensing coil coupler that is connected to the first and second ends of the sensing coil that is configured to split light received from the source-detect coupler and transmit the light in both a clockwise and counterclockwise direction in the sensing coil, and transmits light received from the sensing coil back to the source-detect coupler;

a phase modulator coupled to the sensing coil coupler and to the sensing coil that is configured to introduce a phase difference in electromagnetic waves transmitted through it based on a received signal;

a phase modulation driver coupled to the phase modulator, wherein the phase modulator driver is configured to produce a saw-tooth wave output with a phase shift not equal to 2π or integer multiple thereof as the received signal of the phase modulator; and

a phase sensitive detector comprising:

a detected signal input that is connected to the detected signal output of the source-detect coupler;

a bias modulation signal input that is connected to a bias modulation signal output of the phase modulation driver; and

a demodulator system output that is configured to provide a rotation output signal relating to the rotation of the sensing coil;

wherein the phase sensitive detector is configured to produce the rotation output signal utilizing a demodulation function based on inputs from the detected signal input, and the bias modulation signal input;

the gyroscope further comprising

a feedback mechanism for closed loop operation of the gyroscope that induces, by adjusting the frequency of the saw tooth modulation, a phase difference equal in magnitude and opposite in sign to a phase difference induced by rotation of the gyroscope.

7. (original) The gyroscope of claim 6, wherein the feedback mechanism comprises an additional feedback phase modulator near the sensing coil in an optical path portion used by a counter-propagating electromagnetic wave.

8. (currently amended) A gyroscope, comprising:

a light source that is configured to provide electromagnetic radiation for the gyroscope;

a sensing coil that is configured to sense rotation about an axis, the sensing coil having a first end and a second end;

a source-detect coupler comprising an input that is connected to the light source via a waveguide, and further comprising a detected signal output, the source-detect coupler being further connected to a non-reflective termination arrangement;

a sensing coil coupler that is connected to the first and second ends of the sensing coil that is configured to split light received from the source-detect coupler and transmit the light in both a clockwise and counterclockwise direction in the sensing coil, and transmits light received from the sensing coil back to the source-detect coupler, the sensing coil coupler being further connected to a non-reflective termination arrangement;

a polarizer connected on one side to the sensing coil coupler via a waveguide and connected on another side to the source-detect coupler via a waveguide;

a phase modulator coupled to the sensing coil coupler and to the sensing coil that is configured to introduce a phase difference in electromagnetic waves transmitted through it based on a received signal;

a phase modulation driver coupled to the phase modulator, wherein the phase modulator driver is configured to produce a saw-tooth wave output with a phase shift not equal to 2π or integer multiple thereof as the received signal of the phase modulator;

a phase sensitive detector comprising:

a detected signal input that is connected to the detected signal output of the source-detect coupler;

a bias modulation signal input that is connected to a bias modulation signal output of the phase modulation driver; and

a demodulator system output that is configured to provide a rotation output signal relating to the rotation of the sensing coil;

wherein the phase sensitive detector is configured to produce the rotation output signal utilizing a demodulation function based on inputs from the detected signal input, and the bias modulation signal input.; and

the gyroscope further comprising

a photodetection system that converts a received light signal from the source-detect coupler via a waveguide into an electrical signal, and provides the electrical signal to the detected signal input of the phase sensitive detector; <u>and</u>

<u>a feedback mechanism for closed loop operation of the gyroscope that induces, by adjusting the frequency of the saw tooth modulation, a phase difference equal in magnitude and opposite in sign to a phase difference induced by rotation of the gyroscope.</u>

9. (cancelled)

10. (currently amended) The method according to claim <u>11</u> ~~9~~, further comprising:

creating the detected signal using a photodetection system that receives electromagnetic radiation that has passed through the sensing coil and transforms the signal into electrical energy.

11. (currently amended) ~~The method according to claim 9, further comprising:~~

<u>A method for operating a gyroscope, comprising:</u>

<u>generating electromagnetic radiation in a light source;</u>

<u>splitting the generated electromagnetic radiation with a sensing coil coupler;</u>

<u>providing one part of the split electromagnetic radiation in a clockwise direction into a clockwise leg of a sensing coil;</u>

providing another part of the split electromagnetic radiation in a counterclockwise direction into a counterclockwise leg of the sensing coil;

modulating the electromagnetic radiation in one of the clockwise leg and counterclockwise leg of the sensing coil using a saw-tooth waveform having a phase shift not equal to 2π or integer multiple thereof using a modulation signal;

receiving the provided split electromagnetic radiation with the sensing coil coupler after the electromagnetic radiation has passed through the sensing coil;

providing a detected signal representative of the received electromagnetic radiation to a phase sensitive detector;

producing an output signal based on a rotation rate of the sensing coil by demodulating the detected signal using the modulation signal;

utilizing the output signal to provide an indication of the rotation rate; and

inducing, using a feedback mechanism in a closed loop operation, by adjusting the frequency of the saw tooth modulation, a phase difference equal in magnitude and opposite in sign to a phase difference induced by rotation of the gyroscope.

12. (original) The method according to claim 11, further comprising:

providing an additional feedback phase modulator near the sensing coil in one of the legs of the sensing coil for the inducing of the phase difference.

13. (currently amended) The method according to claim 11 ~~9~~, wherein producing the output signal based on a rotation rate comprises determining the loop transit time or proper frequency.

14. (currently amended) A gyroscope, comprising:

a light source that is configured to provide electromagnetic radiation for the gyroscope;

a sensing coil that is configured to sense rotation about an axis, the sensing coil having a first end and a second end;

a source-detect coupler comprising an input that is connected to the light source, and further comprising a detected signal output;

a sensing coil coupler that is connected to the first and second ends of the sensing coil that is configured to split light received from the source-detect coupler and transmit the light in both a clockwise and counterclockwise direction in the sensing coil, and transmits light received from the sensing coil back to the source-detect coupler;

a phase modulator coupled to the sensing coil coupler and to the sensing coil that is configured to introduce a phase difference in electromagnetic waves transmitted through it based on a received signal;

a phase modulation driver coupled to the phase modulator, wherein the phase modulator driver is configured to produce a periodic wave output with a phase shift not equal to 2π or integer multiple thereof as the received signal of the phase modulator; and

a phase sensitive detector comprising:

a detected signal input that is connected to the detected signal output of the source-detect coupler;

a bias modulation signal input that is connected to a bias modulation signal output of the phase modulation driver; and

a demodulator system output that is configured to provide a rotation output signal relating to the rotation of the sensing coil;

wherein the phase sensitive detector is configured to produce the rotation output signal utilizing a demodulation function based on inputs from the detected signal input, and the bias modulation signal input; the demodulation system output being not identical to the bias modulation signal thus reducing the potential for cross coupling~~.~~

<u>the gyroscope further comprising</u>

<u>a feedback mechanism for closed loop operation of the gyroscope that induces, by adjusting the frequency of the saw tooth modulation, a phase difference equal in magnitude and opposite in sign to a phase difference induced by rotation of the gyroscope.</u>